

**ROCKY FLATS PLANT  
GOLDEN, COLORADO**

**TECHNICAL REVIEW OF THE DRAFT PHASE I  
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION WORK PLAN  
FOR OPERABLE UNIT NUMBER 13**

**U S ENVIRONMENTAL PROTECTION AGENCY  
Region 8, Federal Facilities Branch  
Denver, Colorado**

**ADMIN RECORD**

11 JUL 1980

## 1 0 INTRODUCTION

The general comments relate to the entire work plan, while the specific comments correspond to specific sections of the work plan. Specific comments are keyed to the page, section, and paragraph number of the work plan, or to the figure/table number where appropriate.

## 2 0 GENERAL COMMENTS

The following general comments refer to the overall organization and quality of the work plan. Items that are missing from the work plan are also addressed.

- 1 Section 1 0 describes the scope of the OU 13 work plan as well as the background and physical setting of RFP. The information presented was derived from published reports, is similar to other work plans, and provides an adequate description of the site. The specific comments address a few inconsistencies noted in the section.
- 2 Section 2 0 presents the background and physical setting for OU 13, describes the nature and extent of contamination, and presents the OU's conceptual model. Operational histories for each of the 14 OU 13 IHSSs are presented. Although the data presented in the historical release report (HRR) was used in compiling these narratives, supplemental information was discovered during DOE's research for this work plan. As a result of the supplemental information, many of the IHSS outlines used in this work plan are different in size and/or location from what is shown in the HRR and previous documents. This fact is not clearly stated in the work plan although much of the supplemental information is presented in Appendix A. Therefore, all changes made in this work plan to IHSS locations from previous delineations of the IHSSs must be clearly identified, documented and justified. The geology and hydrology sections summarize the information found in the Geological Characterization Report (EG&G, 1991). The text appears to be an accurate representation of this report.

The second subsection of Section 2 0 describes the nature and extent of contamination at each IHSS. The information presented describes the known contaminant releases. The discussion for each IHSS also includes information on the contamination levels in all media of concern. The data presented is a compilation of the soil and ground-water sampling locations near or in a given IHSS. The basic conclusion in Section 2 0 is that the data is very limited and the contamination cannot be directly traced to a specific IHSS. Because the OU 13 IHSS are surrounded by IHSSs assigned to other OUs, and the existing data is very limited, it is difficult to attribute the known contaminant levels to one IHSS. Therefore, it is recommended that available data must be compiled and summarized to show the trends across the entire OU 13 geographic area. Presenting the data in this fashion will allow the reader to better understand what is known about OU 13 and where additional data should be collected.

The third subsection of Section 2 0 describes the conceptual models for OU 13. The conceptual models have been divided into two groups. Group I addresses releases originating above the ground and affecting surficial materials, whereas group II addresses releases originating below the ground and affecting transport media beneath the ground. The OU 13 IHSSs were assigned to one or both of these groups. Specific comments address some of the inconsistencies noted in this subsection.

- 3 Section 3.0 discusses the chemical-specific benchmarks for the RFP. To be consistent with other OU work plans, this section should be rewritten to include a discussion of the applicable or relevant and appropriate requirements (ARARs) process. Although ARARs have not been defined for RFP, these chemical-specific benchmarks are one step in the ARARs process and should be discussed as such. The preliminary identification of potential chemical-specific ARARs for surface water and ground water is the subject of a separate review process and comments from EPA and CDH will be submitted in a separate document. The final version of this work plan must be amended to reflect any such comments that are submitted.
- 4 Section 6.0 (the field sampling plan [FSP]) organizes the proposed OU 13 field work into three stages. This phased approach is in agreement with the Colorado Department of Health's (CDH) request. However, a detailed review of the FSP revealed several problems with the proposed field work. The following paragraphs describe the general problems of the FSP and suggest solutions to the problems.

The stage 1 sampling effort was designed to determine the presence of contamination. To this end, the following two screening methods were chosen: (1) high purity germanium (HPGe) gamma ray detection for radionuclides and (2) soil gas survey for volatile organic compounds (VOCs). Although radionuclides and VOCs are some of the major compounds of concern, metals also potentially contributed to the contamination at IHSSs 117, 134, and 171. Screening methods to determine the presence of metals must also be proposed in the FSP.

The stage 2 sampling effort does not appear to be well thought out, in regards to the stage II activities. It seems that groundwater (and soil) screening samples need to be collected using a hydraulic probing rig and small diameter probes (approximately 1") prior to drilling any boreholes to further delineate any contamination detected from the stage I surveys. Only after this data is all analyzed and mapped shall boreholes be located and drilled. In addition, some of the boreholes would need to be completed as monitoring wells immediately, as opposed to the proposed plan that does not mention completion of any stage II boreholes as monitoring wells.

Although on page 2-18 it is stated that "Additional wells are needed that penetrate the bedrock to a depth deep enough to evaluate the presence of the No. 1 Sandstone", no details could be found in the field sampling plan that specified this type of activity. It is necessary to drill approximately 15' to 25' of bedrock in at least five different locations to make such an evaluation.

The FSP did not provide individual maps of each IHSS to illustrate the proposed sampling locations. Instead, maps illustrating all IHSSs in OU 13, were used. Two maps (Figures 6-2 and 6-3) illustrate the radiation survey and soil gas survey grid sizes and spacing. To clearly illustrate where the samples will be collected, individual maps of each IHSS must also be prepared. These maps must include all sample locations, buildings, tanks, paved areas, and other surface features that would affect sampling locations.

The field work presented in this section is intended to represent the IAG OU 13 field work requirements and the modifications agreed to during the January 28, 1992 field visit. During the field visit, CDH agreed that some modifications to the IAG FSP were necessary because of access problems and physical obstructions (Baughman, 1992). The U.S. Department of

Energy (DOE) then prepared an outline of its proposed OU 13 FSP (Simonson, 1992). However, review of the OU 13 work plan revealed that the proposed work does not completely match the previously submitted FSP outline. All these noted deviations should be explained and justified in the FSP. The IHSS sampling procedures and locations that differ from those originally proposed are listed in the specific comments section of this report.

No information was provided regarding the effectiveness, limitations, sensitivities, or field procedures of the two proposed field screening methods: HPGe gamma ray detector and the soil gas survey. This information is crucial in determining whether a proposed sampling method will be effective at an IHSS and must be included in the work plan.

The individual summaries of the stage 1 sampling effort for each IHSS include a listing of the compounds to be analyzed for during the soil gas survey. The list of compounds was chosen based on the IAG requirements and historical data points obtained during preparation of the work plan. However, compounds that are not listed in the IAG but that are on the analyte list for several IHSSs (117 1, 117 2, 128, 134, 148, 157 1, 158, 171, and 186) are not discussed in Section 2.0 of the work plan. This section includes a review of the known nature and extent of contamination at each IHSS. The FSP should specifically explain why these additional compounds were chosen for analysis. The information presented in Section 2.0 should also support the inclusion of these compounds on the analyte list.

The FSP does not address the potential effect on OU 13 of contamination from newly identified potential areas of concern (PACs) and under building contamination (UBC). PACs overlap the current OU 13 IHSSs and the OU 13 geographic area should be researched to determine whether the proposed FSP is appropriate to address all contamination possibilities. UBC could have a direct impact on ground-water contamination, and a means whereby the FSP can take this information into account will need to be developed to support remedy selection.

The stage 3 investigation does not include any surface water or sediment sampling. These media must be evaluated in determining the extent of OU 13 contaminants. Information from ongoing "routine" monitoring, samples from other OU investigations, or additional sampling needed to provide the information required to support this determination must be identified.

Surficial soil samples and depth profile samples must be collected at a subset of the HPGe survey locations and analyzed to evaluate the vertical extent of radionuclide contamination. The specific comments also address expanding the scope of surficial soil sampling.

Justification should be provided for the chosen grid spacing for the radiological and soil gas surveys. Information to be considered includes statistics, site histories, and capabilities of the chosen screening technologies. This specific information should be incorporated into an additional section of the FSP.

- 5 Section 8 (human health risk assessment) presents a cohesive strategy to carry out the human health risk assessment for OU 13. It discusses in sufficient detail the four essential components of the risk assessment process as outlined in the *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual* (RAGS) (EPA, 1989). Each section presents enough information to conclude that the correct methodology will be employed.

HRR not  
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The work plan contains two problem areas to EPA's stated position, and EPA guidance (1989). The first is the intention to use the International Commission on Radiological Protection (ICRP) procedures to estimate risk. The second involves the strategy to be used in selecting potential chemicals of concern (COCs). The following sections contain specific comments regarding these deficiencies.

- 6 The ecological evaluation (Section 9.0) described in the OU 13 work plan states that all ecological studies in industrial areas of the RFP will be conducted under the OU 9 remedial investigation (RI), as described in the OU 9 technical memorandum on ecological studies. This approach will be acceptable as long as all areas and operable units in the industrial area are included. The environmental evaluation for OU 6 (Walnut Creek drainage) will also provide information on the ecological conditions of OU 13.

It should be noted that the work plans for most of the industrial area operable units (OU 9, OU 10, OU 12) identify the primary issue related to the environmental evaluation as the movement of contaminants out of the operable unit by biological vectors. The OU 13 work plan discusses the identification of risks of contamination of off-site biota through the migration of contaminants off-site by physical or abiotic means. The work plans all should have the same objectives if the same studies are to meet those objectives.

### 3.0 SPECIFIC COMMENTS

The following specific comments pertain to technical inadequacies or inconsistencies noted in various sections of the OU 13 work plan.

- 1 Section 1.3.3, page 1-5, Last paragraph This sentence references the recent background geochemical investigation. The scope of the investigation and report submitted in 1990 have been substantially modified. The revised, February 1992, background geochemical investigation plan must also be referenced in this section.
- 2 Section 1.3.4.9, page 1-18, first paragraph The conclusion stated here that "The Arapahoe and the alluvial hydrostratigraphic units at the RFP .. are not generally believed to be capable of producing amounts of water of economic significance ..", must either be quantitatively documented or be deleted. The discussion of hydraulic conductivities in this section is not sufficient to draw such a conclusion.
- 3 Figure 1-12 This figure shows a stratigraphic section for the Rocky Flats Plant. A more detailed stratigraphic section that also includes a revised interpretation for the contact between the Arapahoe and Laramie Formations must be substituted for the older section. Figure 4-53 from *Phase II Geologic Characterization*, (EG&G, 1992), shows this revision alongside a previous stratigraphic column and would be a much better figure to use in this work plan. It would also conform to the geologic map shown in figure 1-9 that was taken from the same document.
- 4 Section 2.1, page 2-1 IHSS 122, Underground Concrete Tanks, is not included on the IHSS list for OU 13. This IHSS was included in the IAG definition of OU 13 but has been

transferred into OU 9, the original process waste lines. The reason that IHSS 122 is no longer considered part of OU 13 must be explained in this work plan.

- 5 Section 2.1.1.1, page 2-2, paragraph 1 The various storage areas, buildings, and paved areas of IHSS 117.1 are not illustrated on Figure 2-1. These features must be added to Figure 2-1, or a separate figure created for IHSS 117.1, for clarity.
- 6 Section 2.1.1.2, page 2-3 and Appendix A, page A-3 Both of these sections provide descriptions of IHSS 117.2. The text states that aerial photographs indicate the area was first used for storage sometime prior to July 1955. The appendix description states that the aerial photographs indicate storage began sometime before July 1954. The aerial photographs should be reviewed again and the correct date used in both areas of the report.
- 7 Section 2.1.1.10, page 2-9, paragraph 1 IHSS 169 is believed to describe the same hydrogen peroxide spill associated with IHSS 191. For this reason, IHSS 169 is proposed to be eliminated from OU 13. This section must also state whether CDH and EPA concur with the conclusion that IHSS 169 can be eliminated.
- 8 Section 2.1.3.5, page 2-16, last paragraph The text states that well P113589 is southwest of OU 13. This should be corrected to well P313589 which is southeast of OU 13.
- 9 Section 2.1.4.1, page 2-19, paragraph 2 The unnamed tributary of North Walnut Creek that is discussed here is better identified in figure 2-24 than in figure 1-4 that is referenced. A change in referenced figures should be made here.
- 10 Section 2.1.5, page 2-22 This section discusses surface water in the OU 13 area and beyond, but does not present a clear and detailed figure to illustrate all of the current surface water drainage flow paths within this OU. Not only must this be presented for the current situation, but depictions of historical surface water flow paths must also be included to help determine past potential routes of contamination migration.
- 11 Section 2.1.5.1 and 2.1.5.2, page 2-23, paragraphs 2 and 3 It is stated on this page that both North Walnut Creek and upper (South) Walnut Creek are perennial streams. This directly contradicts a statement made on page 1-9. Whichever case is correct must be stated consistently in both sections.
- 12 Section 2.2, page 2-26, paragraph 1 This section discusses how the available analytical data were compared to the background data presented in the background geochemical characterization report (EG&G, 1990). As stated previously, this report has undergone substantial revision and EPA is currently reviewing the Background Geochemical Characterization Plan (EG&G, 1992b). Therefore, discussion of contamination compared to background must be qualified that it is related to interim values at this time.
- 13 Section 2.3.1.2, page 2-80, last paragraph This section states that the surface water pathway will be evaluated by surface water sampling. However, no surface water sampling is proposed in the FSP. A surface water sampling program must be added to this work plan.

- 14 Section 2.3.2.1, page 2-84, and Section 5.1.1.3, page 5-7 Both these sections state that only IHSSs 128 and 148 were assigned to both group I and II conceptual models. However, IHSS 191 was also assigned to both group I and II, therefore, this IHSS must be included in the above-referenced sections.
- 15 Section 2.3.2.1, page 2-89, first paragraph IHSS 186 contaminant sources are included in the group I conceptual model IHSS discussion. The discussion of IHSS 186 should be moved to the group II conceptual model discussion in Section 2.3.2.2.
- 16 Section 2.3.2.1, page 2-90, paragraph 2 It is stated here that "No evidence has been found indicating that soils were contaminated at IHSS 117.1." This contradicts the analytical results of soil samples taken borehole P214689, located in IHSS 117.1. This statement must be deleted or altered to agree with the data previously presented.
- 17 Section 2.3.2.2, page 2-93 IHSS 191 is not discussed in this section, even though it is listed as one of the IHSSs included in the group II conceptual model. A brief discussion of IHSS 191 should be added to this section.
- 18 Section 2, Figures 2-5, 2-6, and 2-16 The triangle symbols shown on these maps, probably pre-1986 boreholes, must be explained in the legends.
- 19 Section 4.3, page 4-3, paragraph 1 Visual inspections are listed as one of the three activities to be conducted during the phase I field investigation of screening activities. Only radiological and soil gas surveys are listed as screening activities in Section 6.0 of the FSP. Visual inspections must be added to the text and tables of the FSP.
- 20 Section 4.3, page 4-3, paragraph 1, and Section 4.5.1, page 4-4, paragraph 5 Both paragraphs state that surface water and sediment sampling will be conducted at OU 13. Neither of these media is proposed to be sampled in any of the three stages of OU 13 field investigations. As stated in the general comments, surface water and sediment sampling should be included in the FSP, unless it can be demonstrated that required information is available from other programs or other OUs.
- 21 Section 4.8, page 4-11, last paragraph The third sentence in this paragraph is potentially overly restrictive when considering innovative and alternative technologies, and must be deleted.
- 22 Section 4.9, page 4-16, last bullet This statement implies that a Phase II investigation will occur. It is intended that only one phase of investigation shall be necessary for this OU. This bullet must be modified to indicate that additional investigation will only be undertaken if deemed necessary, due to identification of data gaps.
- 23 Section 5.1.1.3, page 5-7 The second bullet on this page incorrectly references IHSS 169. This IHSS is believed to be the same as IHSS 191, and is referred to as IHSS 191 throughout the work plan. This bullet should be revised for consistency.
- 24 Section 5.1.2.5, page 5-11, last paragraph The text discusses sub-asphalt surface scrape samples that may exhibit concentrations of TCL semi-volatiles and TAL metals. Asphalt

samples are proposed to be collected from such locations and analyzed for TCL volatiles and TAL metals to determine to what extent the asphalt is the source of the contamination. The asphalt samples must be analyzed for TCL semi-volatiles in order to make such a comparison and also to agree with the analytes shown in Table 6-1. In addition, this paragraph seems to imply that contaminants detected in the asphalt are not related to IHSS contamination sources. This implication is not necessarily correct and the text must be clarified accordingly.

- 25 Section 5.1.2.5, page 5-12, paragraph 2 The second sentence states that "A minimum of one randomly located borehole will be drilled in every IHSS." Since this is a stage two activity, it seems that all boreholes should be drilled in locations that would be determined on the basis of previously collected data, both historical and stage one surveys. Randomly locating boreholes is inefficient and inconsistent with a multi-stage screening process that should be used to optimize placement of boreholes and reduce the number of boreholes needed to delineate the nature and extent of contamination.
- 26 Table 5.1 The data quality objectives (DQO) listed in this table do not match the objectives of the FSP. These two sections of the work plan must be revised so that the objectives listed in both the table and FSP are equivalent.
- 27 Table 5.4 Under radionuclides, this table must also include the detection/quantitation limits for strontium 89/90, strontium 90, cesium 137, radium 226, and radium 228, all of which are proposed analytes listed in the text on page 5-12.
- 28 Section 6.1.1, page 6-2, paragraph 1 The FSP states that only analytical data for ground water, surface water and borehole samples are available for OU 13. However, Section 2.0 described air monitoring and sediment data. Samples collected from all media of concern must be described in this paragraph.
- 29 Section 6.1.1, page 6-2, paragraph 2 It is stated that "The data indicate the potential for contamination to be present at several IHSSs." Certainly this potential exists for all IHSSs, and so a change in wording is needed here.

The following sentence discusses ongoing validation of the existing data, but does not mention when this effort will be completed or how much of the data has been validated to date. This must be stated as accurately as possible in order to facilitate planning and investigation decisions.

- 30 Section 6.1.4, page 6-5 The section states that areas of overlap between OU 13 IHSSs and IHSSs in other OUs will be examined to prevent duplication of effort. The specifics of how duplication of effort will be avoided must be provided. Since each RFP OU has a different EG&G project manager, a different contractor writing the work plan, and a different contractor conducting the field effort, there is a concern regarding coordination of effort. Listing the IHSSs and associated OUs that overlap with OU 13 is the first step toward a coordinated field effort.

In the last paragraph of this page it is stated that, "no further investigation of IHSSs 190 and 191 is necessary", as a result of the types of releases attributed to these IHSSs. It is agreed that the sodium hydroxide and hydrogen peroxide that were released in 1978 and 1981



respectively, are probably no longer impacting human health or the environment. Nevertheless, the outline of IHSS 190 included the Central Avenue Ditch out to pond B-1. This drainage should certainly be investigated for other contaminants. If this is not done in conjunction with the OU 13 RFI/RI, it must be stated here how it will be accomplished.

- 31 Section 6.2.1, page 6-6, paragraph 2 The FSP states that a 4 to 8 inch hole will be bored through the paved areas of individual IHSSs to allow access for the surveys. As written, this statement applies to both radiation and soil gas surveys. It is true that HPGe conducted above asphalt provides only limited information on the soils beneath. However, cutting a hole through the pavement will not increase the effectiveness of the HPGe. The detector is placed a set distance above the ground and measures gamma rays in its field of view. The field of view is an area larger than a 4 to 8 inch hole in the ground. To obtain measurements from paved areas, the asphalt should be cored and a surficial soil sample collected. At RFP OU 12, the collected surficial soil samples will be stored in containers for 30 days, then, a shielded HPGe at an onsite laboratory will be used to detect concentrations of gamma-emitting radionuclides. A similar program must be instituted at OU 13. The sampling plan currently proposed will not provide meaningful information on the radionuclide concentration beneath paved areas of the IHSS.
- 32 Section 6.2.1.5, page 6-11 The lithium destruction site was used to destroy both lithium and magnesium. However, neither of these metals will be analyzed for in the stage I survey. Since these two metals are considered the major contaminants of concern, and are only relatively mobile in the environment, surficial soil samples must be collected and analyzed for these compounds.
- 33 Section 6.2.1.6, page 6-12 The FSP proposes a soil gas survey for IHSS 148. Neither the IAG or the proposed FSP outline included a soil gas survey for this IHSS. The historical data referenced on this page from which the analyte compound list was determined must be provided.
- 34 Section 6.2.1.7, page 6-13, paragraph 2 The soil gas survey proposed for this IHSS must be extended down gradient in order to better investigate the presence of potential subsurface fuel oil contamination. By limiting the extent of the survey to the IHSS boundary the location of such contamination may not be covered.
- 35 Section 6.2.2, page 6-18, last paragraph It is stated here and elsewhere in the work plan that surficial soil samples will only be taken at the location of each borehole. This is certainly not sufficient in either size or distribution to characterize the nature and extent of contamination in surficial soils for this OU. A more extensive approach must be added to the FSP that also discusses and justifies the frequency of surficial soil sampling.
- 36 Section 6.4, Table 6-3 This table, which details the frequency with which QC samples will be collected and analyzed, could not be found in the work plan.
- 37 Figures 6-2 and 6-3 In most cases, these figures indicate that soil gas surveys and radiation surveys will be conducted across the entire IHSS boundary. The figures do not correspond to several descriptions in the text. The descriptions for IHSS numbers 128, 134, 152, 157, 1, 158, 171, and 186 all indicate that these surveys will be conducted in only certain areas of the

IHSSs Just the opposite is true for IHSS 148, since the figures show only the area covered by building 123 as being the location for the surveys but the text describes a larger area Detailed IHSS sampling location maps must be prepared that clearly illustrate the areas to be sampled

- 38 Section 8 0, page 8-2, first paragraph The work plan states that, "The EPA and DOE require a two-phase evaluation for the radiological portion of the assessment" and, "The implementation of procedures established by the International Commission on Radiological Protection (ICRP) and adopted by the EPA (is) used to estimate the radiation dose equivalent to humans from potential exposure to radionuclides through all pertinent exposure pathways " This statement is not accurate EPA does not currently require the ICRP method to be used, either alone or in tandem with the methodology presented in RAGS Indeed, the ICRP method, because it was developed for occupational exposure and based on a "Reference Man," is not entirely appropriate for use at a Superfund site The reference man is healthy, 20 to 30 years of age, and clearly does not represent the general public that may be exposed to radionuclides A more complete description of the disparities between ICRP and EPA methodology can be found in *Transuranium Elements, Volume II, EPA Office of Radiation Programs*. Since the risk assessment is intended for EPA, it must use EPA-derived procedures Until the ICRP method is officially adopted by EPA Region 8, it must not be included in the risk assessment, except perhaps as an addendum
- 39 Section 8 1 2, page 8-3, second bullet Dermal exposure to contaminants in soil was omitted and must be included as a possible exposure route from surficial soils
- 40 Section 8 2, page 8-4 It is stated that "the objective of this section is to describe the procedures to identify source-related contaminants present at OU 13 at concentrations that could be of concern to human health " There are 15 IHSSs that make up OU 13, which is itself one of many OUs at the Rocky Flats Plant The objective stated here seems to imply that contamination not deemed "source-related" will not be evaluated What constitutes "source-related contamination," however, remains undefined EPA guidance states that "personnel involved in conducting the human health evaluation for a focused RI/FS [feasibility study] must be mindful of other potential exposure pathways considering risks from all related operable units" (EPA, 1989) And further, "it is extremely difficult to conclusively show that chemicals are present at the site due to operations not related to the site or surrounding area" (EPA, 1989) The contamination and associated potential risks at OU 13 must be fully characterized If contaminants are eliminated from consideration because they are not "source-related" without any other appropriate justification, the evaluation will be rejected as incomplete
- 41 Section 8 2 2, page 8-6, first paragraph The second sentence delineates TICs that will be excluded from the Human Health Risk Assessment This statement seems to be premature and must be deleted.
- 42 Section 8 2 3, page 8-6, second paragraph The word "RFP-related" must be removed from the first sentence
- 43 Section 8 2 4, pages 8-6 and 8-7 The flow chart (Figure 8-2) and description of the strategy to be used in the selection of contaminants of concern (COCs) contains major design flaws

The steps must be rearranged because the order of criteria in the flow chart is as critical to the selection process as is the specific criteria used to select COCs. For example, no class A carcinogen should be eliminated from the risk assessment under any circumstance. However, as presented in the flow chart, known human carcinogens could be eliminated in the first or second step. A decision must be made about class A and B carcinogens in the initial screening step.

RAGS states that, "In general, comparison with naturally occurring levels is applicable only to inorganic chemicals, because the majority of organic chemicals found at Superfund sites are not naturally occurring." Accordingly, the elimination of background chemicals must be limited to inorganic chemicals. Moreover, background concentrations must be collected from an area minimally impacted by man and must accurately represent the RFP area. Due to natural variation of geographical regions, U.S. Geological Survey data should not be used for this purpose, unless it can clearly be shown that the data were specifically drawn from the area.

RAGS presents the concentration-toxicity screen in great detail. It should be used instead of the screening step which uses one-tenth health environmental criteria for elimination. The one-tenth criteria is not an EPA-endorsed methodology.

44. Section 8.2.4, page 8-7, paragraph 2 It is stated here that the data will be evaluated according to RAGS section 5.9.3 to determine if the detection frequency is greater than 5 percent. RAGS does not state that 5% is the detection frequency limit - it says that "any detection limit to be used (e.g., 5%) should be approved by the RPM prior to using the screen."
45. Section 8.2.4, page 8-8, paragraph 2 This section states that chemicals which are essential human elements need not be considered further in the quantitative risk assessment. Prior to eliminating those chemicals, however, they must be shown to be present at levels that are not associated with adverse health effects. Hence, a quantitative risk assessment must be performed. In addition to the relatively innocuous constituents described in the plan, be aware that chemicals such as arsenic and selenium are also considered essential elements.
46. Section 8.3.1, page 8-9, paragraph 3 In this and other sections, worker exposure is alluded to although no exposure pathways, scenarios, or receptors are defined in this work plan. As stated, the references to workers seem to presume without justification that workers are the only potential receptors. Acknowledgement that consideration will also be given to other exposure scenarios and associated receptors must be provided or the reference to workers must be deleted.
47. Section 8.3.1, page 8-9, paragraph 3 The definition provided for the Reasonable Maximum Exposure is not exactly correct. Exposure is a function of chemical concentration, contact rate, exposure frequency and duration, body weight, and averaging time. The exposure concentration RME is defined as the 95 percent upper confidence limit on the arithmetic average. The RME for the other components of exposure cannot be based solely on quantitative information, but also requires the use of professional judgement.

- 48 Section 8.4, page 8-13, paragraph 2 The discussion of toxicity values focuses on RfDs and cancer slope factors with no mention of Inhalation Reference Concentrations (RfCs) These values will be important when assessing the inhalation pathway or the volatilization of contaminants from ground water or surface water They must also be discussed in this section
- 49 Section 8.4, page 8-13, paragraph 4 This section discusses the information sources of toxicity values which are used by EPA The authors should be aware that there is an established hierarchy of data sources within EPA As described in RAGS, the IRIS system is first, followed by the HEAST, and then toxicity values developed in consultation with the ECAO Technical Support Center This section gives the reader the impression that, other than IRIS, the other sources of information available are equal in quality and preference
- 50 Section 8.5, page 8-15, paragraph 2 The method presented in this paragraph for assessing non-cancer health effects is overly aggressive and may be unnecessary Hazard Quotients (HQs) are initially the sum of all Hazard Indexes (HIs), regardless of mechanism of action. Then, if the HQ exceeds 1 the compounds are segregated based on target organ and mechanism of action. This segregation process can be complex and time consuming, and should not be undertaken unless it is known that the sum of all the HIs clearly exceed one
- 51 Section 9.1, page 9-1, paragraph 1 If there are no viable ecosystems or natural habitats presently existing in OU 13, as stated here, why is this OU being considered for an ecological preserve?
- 52 Section 9.3, page 9-3, paragraph 2, bullet 1 The work plan states that the presence of target taxa, which are accumulating or concentrating target analytes, is a criterion for initiating ecotoxicological studies The method for determining concentration or accumulation of chemicals prior to ecotoxicological studies is not clear The criterion must be clarified.
- 53 Section 9.3, page 9-3 In the section under Ecotoxicological Investigations, a number of conditions were presented which would trigger an investigation. What about the effect of contaminants moving off-site and adversely affecting target taxa?
- 54 Section 10, Figure 10-1 This figure should be updated with the names of the personnel who are currently in the positions shown on the chart.
- 55 Page A-1, A-3, and A-52, Appendix A The site maps for IHSSs 117 1, 117 2 and 190 are not attached as stated These maps should be provided
- 56 Page A-8, Appendix A A new PAC is discussed in this section It is believed that this area is PAC 400-802 identified in the HRR (EG&G, 1992a) The PAC number should be listed in this section so that the reviewer can reference the material
- 57 Page A-16, Appendix A The historical information describing the location of the oil burn pit in IHSS 128 is different that the location as described in the HRR The HRR stated that building 355 now covers the area of IHSS 128, whereas the work plan appendices indicate that this IHSS was located in the area covered by Sage Avenue and the adjacent drainage

ditch The text in the work plan describes the location north of building 335 Because the work plan does state that new information revealed the originally proposed location of IHSS 128 is not correct, there is some question as to whether the work plan IHSS location is accurate The discrepancies between the HRR and the work plan must be explained so that there is confidence that the sampling will be done in the right areas

- 58 Page A-23, Appendix A and Figures 2-1, 6-2 and 6-3 Research conducted during the preparation of the OU 13 work plan indicated that the boundary for IHSS 134 should be expanded. It is currently believed that lithium was burned in scattered areas between IHSS 171 and the addition to building 331 However, the figures that illustrate the location of IHSS 134 do not encompass the entire described area Since there is no way to determine areas which have been affected without sampling, the entire area should be considered an IHSS The boundaries for IHSS 134 should be expanded and the figures modified accordingly
- 59 Page A-38, Appendix A, Paragraph 3 This paragraph states that the borehole data for a borehole located at N36,650 and E19,650 is attached No borehole information was provided This information should be added to the Appendix A discussion of IHSS 158